



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Materials science

### Course

Field of study

Aerospace Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

PhD Marta Paczkowska

Responsible for the course/lecturer:

email: [marta.paczowska@put.poznan.pl](mailto:marta.paczowska@put.poznan.pl)

tel.: 61 647 5906

Faculty of Transport Engineering

Piotrowo 3 st., 60-965 Poznań

### Prerequisites

Student has basic knowledge of chemistry and polymers, ceramics and composites. Is able to learn using various sources of information.

### Course objective

Understanding the basics of building, obtaining, ownership and use of aviation and industrial materials, and basic knowledge of polymers, ceramics and composites such as definitions, classification, structural structure, the most important properties and applications, in practice.

### Course-related learning outcomes

Knowledge

1. has knowledge of the physical and chemical properties of materials in aircraft construction



2. has expanded knowledge necessary to understand the impact of materials on mechanical and thermal strength of components in aircraft components

3. has basic knowledge of metal, non-metallic and composite materials used in aviation engineering

#### Skills

1. knows how to use technical language in the field of concepts and definitions in the field of aviation materials

2. has the ability to self-study with the use of modern teaching tools, such as websites and databases of material characteristics

3. Is able to assign materials according to their properties to appropriate aviation components

#### Social competences

1. is able to properly define priorities for the implementation of tasks specified by himself or others based on available knowledge of materials science

2. Understands the need for a critical assessment of knowledge in the field of materials science and continuous education

3. is aware of the responsibility for knowledge in the field of material science and transfer it in an understandable way

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. Written exam from lectures

2. Credit based on reports

#### Programme content

Polymer materials - general characteristics, chemical structure, chain structures. Technical significance of polymeric materials. Engineering ceramics - general classification and characteristics. Engineering cermets. Porous ceramics. Refractory materials. Glass and glass ceramics. Carbon materials. Composite materials - Definition and classification. General characteristics of composite materials. Concrete and asphalt as composite materials. Fiber reinforcing composite materials. Fiber-reinforced polymer matrix composite materials. Fiber-reinforced metal matrix composite materials. Ceramic and carbon matrix composite materials reinforced with fibers. Layered composite materials. Wood as a natural composite material.

PART-66

MODULE 6. MATERIALS AND EQUIPMENT

6.3 Materials for aircraft construction - composites and non-metals

6.3.1 Composites and non-metals other than wood and fabric



a) Characteristics, properties and identification of common composites and non-metals, other than wood, used to build aircraft; Connecting and sealing agents [2]

b) Detection of defects / deterioration in the quality of composites and non-metallic materials; Repair of composites and non-metallic materials. [2]

### 6.3.2 Wooden structures

Construction methods of wooden airframe structures; Characteristics, properties and types of wood and glues used in aircraft; Preservation of wooden structures; Types of defects in wooden materials and structures; Detection of defects in wooden structures; Repair of wooden structures. [2]

### 6.3.3 Fabric covers

Characteristics, properties and types of fabrics used in aircraft; Fabric testing methods; Types of defects in fabrics; Repair of fabric covers. [2]

## Teaching methods

Assessment on the basis of prepared reports from laboratory exercises and activity during classes.

## Bibliography

### Basic

1. M. Blicharski: Wstęp do inżynierii materiałowej, WNT, 2003.
2. M.F. Asbhy, D.R.H. Jones: Materiały inżynierski, t2. WNT, 1996
3. L. A. Dobrzański: Podstawy nauki o materiałach i metaloznawstwo, WNT, Gliwice 2002
4. D. Żuchowska: Polimery konstrukcyjne, WNT, Warszawa, 2000
5. J. Nowacki: Spiekane metale i kompozyty z osnową metaliczną
6. Leszek. A. Dobrzański, ?Podstawy nauki o materiałach?, WNT, Gliwice 2006

### Additional

1. Michael Ashby i in.: Inżynieria materiałowa, tom I i II, Wydawnictwo Galaktyka, 2006
2. Michael Ashby i in.: Materiały inżynierskie, tom I i II, WNT, 1996



### Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	50	2,0

<sup>1</sup> delete or add other activities as appropriate